UNITED STATES PATENT AND TRADEMARK OFFICE

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2008*.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-14 and 16-19* is/are rejected.
7)☒ Claim(s) *15 and 20* is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on *31 January 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
        1.☐ Certified copies of the priority documents have been received.
        2.☐ Certified copies of the priority documents have been received in Application No. _____.
        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date *1/31/05;6/23/08*.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____ .

DETAILED ACTION

Claim Rejections - 35 USC § 101

1.   35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2.   Claims 1 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 1 recites, "A method for determining the phase of a complex number corresponding to an input signal, the method comprising the acts of: **normalizing the complex number….processing the normalized complex number….determining the phase ...**"

Claim 1 is rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. While the claims recite a series of steps or acts to be performed, a statutory "process" under 35 U.S.C. 101 must (1) be tied to particular machine, or (2) transform underlying subject matter (such as an article or material) to a different state or thing. See page 10 of In Re Bilski 88 USPQ2d 1385.

The instant claims are neither positively tied to a particular machine that accomplishes the claimed method steps nor transform underlying subject matter, and therefore do not qualify as a statutory process.

For example, the method including steps of " **normalizing the complex number….processing the normalized complex number….determining the phase** " is broad enough that the claim could be completely performed mentally, verbally or without a machine nor is any transformation apparent. Thus, the method claim

1) do not tied to particular machine (such as a particular apparatus) by identifying the apparatus (e.g. close loop circuit) that accomplishes the method steps

OR

2) do not transform underlying subject matter (such as an article or material) to a different state or thing.

Thus, claim 1 is non-statutory.

Claim 2-8 are also rejected since they are depended upon rejected claim 1 set forth above.

Claim Objections

3.   Claims 6, 14, 15, 19 and 20 are objected to because of the following informalities:

Claim 6 recites **"the number"** in line 2. For consistency and clarification with "a predetermined number" recited in claim 4, line 2, it is suggested to change "the number" in line 2, to "the predetermined number".

Claim 14 recites the clause with the optional language "**adapted to**" in lines 3, 5, 7. In order to present the claim in a better form and to describe a positive or require steps/function to be performing (i.e. using the claim language that does not suggest or make optionally but required steps to be performed), applicant is suggested to revise the claim language such that the steps/functions, which follows "adapted to", to be performed are required (not optional). Appropriate correction is required.

Claims 15, 19, and 20 are also objected for the same reason as set forth in claim 14.

Claim Rejections - 35 USC § 102

4.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5.   Claims 1, 3 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Denno (US

5,287,067).

Regarding claim 1, Denno discloses a method for determining the phase of a complex

number corresponding to an input signal (see FIG. 4, receiving apparatus that

determines/estimates the phase of a complex number corresponds to the input signal S; See col.

4, line 56 to col. 5, line 15), the method comprising the acts of:

normalizing the complex number (see FIG. 4, frequency compensation circuit 44

normalizes/compensate the complex number $U=u1+ju2$) to obtain a normalized complex number

(see FIG. 4, to obtain/generate a compensated/normalized complex number; see col. 4, line 64 to

col. 5, line 29);

processing the normalized complex number through a closed loop (see FIG. 4, 5, the

combined closed loop system of phase error estimation 21 and phase equalization circuit 22

receives the a compensated/normalized complex number signal; see col. 5, line 30 to col. 6, line

16) to produce a signal that is proportional to the phase of the complex number (see FIG. 4, 5, to

generate/produce a signal D which is proportional/relative to the phase of the complex number);

and

determining the phase of the complex number (see FIG. 4, 5, phase equalization circuit

22 estimates/determine the phase of the complex number) from the signal that is proportional to

the phase of the complex number (see FIG. 4, 5, from the signal D which is proportional/relative

to the phase of the complex number; see col. 5, line 49 to col. 6, line 25; see col. 8, line 65 to col.

10, line 56).

Regarding claim 3, Denno discloses wherein the act of processing the normalized

complex number comprises waiting for loop convergence (see FIG. 4, frequency compensation

circuit wait/stop for loop convergence/meet/junction where the loop comprises phase error

estimation 21 and phase equalization circuit 22; see col. 5, line 30 to col. 6, line 16).

Regarding claim 9, Denno discloses a device that determines the phase of a complex

number (see FIG. 4, receiving apparatus that determines/estimates the phase of a complex

number; See col. 4, line 56 to col. 5, line 15), the device comprising:

circuitry (see FIG. 4, frequency compensation circuit 44) that normalizes the complex

number (see FIG. 4, normalizes/compensate the complex number U=u1+ju2) to produce a

normalized complex number (see FIG. 4, to produce/generate a compensated/normalized

complex number; see col. 4, line 64 to col. 5, line 29); and

a closed loop circuit (see FIG. 4, 5, the combined closed loop system of phase error

estimation 21 and phase equalization circuit 22; see col. 5, line 30 to col. 6, line 16) that receives

the normalized complex number (see FIG. 4, receives the a compensated/normalized complex

number; see col. 5, line 10-45) and produces an output that is proportional to the phase of the

complex number (see FIG. 4, generates/produces an output signal D which is

proportional/relative to the phase of the complex number; note that phase equalization circuit

equalizes the phase in order to generated proportional/corrected/relative to the phase of the

received complex number; see col. 5, line 49 to col. 6, line 25; see col. 8, line 65 to col. 10, line

56).

Claim Rejections - 35 USC § 103

6.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

7.   Claims 2, 10 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Denno in view of Ohkubo (US 5959965).

Regarding Claim 10 and 16, Denno discloses receiver (see FIG. 4, receiving apparatus

that determines/estimates the phase of a complex number; See col. 4, line 56 to col. 5, line 15),

comprising:

circuitry (see FIG. 4, a combined system of carrier complex multiplier 1, LPF 3, A/D 4)

that receives a transmitted signal (see FIG. 4, receives a transmitted signal S) and convert at least

a portion of the transmitted signal into a complex number (see FIG. 4, converts/change the signal

D into a complex number U; see col. 4, line 64 to col. 5, line 24);

circuitry (see FIG. 4, frequency compensation circuit 44) that normalizes the complex

number (see FIG. 4, normalizes/compensate the complex number U) to produce a normalized

complex number (see FIG. 4, to produce/generate a compensated/normalized complex number;

see col. 4, line 64 to col. 5, line 29); and

a closed loop circuit (see FIG. 4, 5, the combined closed loop system of phase error

estimation 21 and phase equalization circuit 22; see col. 5, line 30 to col. 6, line 16) that receives

the normalized complex number (see FIG. 4, receives the a compensated/normalized complex

number; see col. 5, line 10-45) and produces an output that is proportional to the phase of the

complex number (see FIG. 4, generates/produces an output signal D which is

proportional/relative to the phase of the complex number; note that phase equalization circuit

equalizes the phase in order to generated proportional/corrected/relative to the phase of the

received complex number; see col. 5, line 49 to col. 6, line 25; see col. 8, line 65 to col. 10, line

56).

Although Denno discloses "a receiver" determines/estimates the phase of a complex

number as set forth above,

Denno does not explicitly disclose *"An Orthogonal Frequency Division Multiplexing*

(OFDM)" receiver.

However, utilizing OFDM technology is so well known in the art. In particular, Ohkubo

teaches an Orthogonal Frequency Division Multiplexing (OFDM) receiver (see FIG. 1, OFDM

receiver), comprising:

circuitry (see FIG. 1, the combined system of mixer 3 and quadrature-demodulated 5)

that receives a transmitted OFDM signal and converts at least a portion of the transmitted OFDM

signal into a complex number (see FIG. 1, receives the OFDM signals and coverts/change into I

signal and Q signal (i.e. complex number); see col. 9, line 10-30);

a closed loop circuit (see FIG. 1, a combined loop circuit of frequency deviation detector

11 and oscillator 10) that receives the complex number (see FIG. 1, receive complex number

from FFT processor 7) and produces an output that is proportional to the phase of the complex

number (see FIG. 1, generates/produces an output with corrected that is proportional/relative to

the phase of the complex number; see col. 9, line 20 to col. 11, line 65).

Therefore, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to provide *An Orthogonal Frequency Division Multiplexing (OFDM)"*

receiver as taught by Ohkubo in the system of Denno, so that it would provide a device which

detects and automatically corrects a frequency deviation caused when a received signal is

frequency-down-converted in a receiver of OFDM signal; see Ohkubo col. 7, line 35-45.

Regarding claim 2, Denno discloses receiving a signal (see FIG. 4, a combined system

of carrier complex multiplier 1, LPF 3, A/D 4 receive a signal S) and wherein the complex

number corresponds to at least a portion of the signal (see FIG. 4, the complex number

correspond to the signal; see col. 4, line 64 to col. 5, line 24).

Denno does not explicitly disclose *"An Orthogonal Frequency Division Multiplexing*

(OFDM)" receiver.

However, utilizing OFDM technology is so well known in the art. In particular, Ohkubo

teaches an Orthogonal Frequency Division Multiplexing (OFDM) receiver (see FIG. 1, OFDM

receiver) and

wherein the complex number corresponds to at least a portion of the OFDM signal (see

FIG. 1, I signal and Q signal (i.e. complex number) corresponds to the OFDM signal; see col. 9,

line 10-30).

Therefore, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to provide *An Orthogonal Frequency Division Multiplexing (OFDM)"*

receiver as taught by Ohkubo in the system of Denno, so that it would provide a device which

detects and automatically corrects a frequency deviation caused when a received signal is

frequency-down-converted in a receiver of OFDM signal; see Ohkubo col. 7, line 35-45.

8.   Claim 4, 6, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Denno in view of Geile (US 20090122883).

Regarding Claims 4 and 6, Denno discloses wherein the act of waiting is performed as

set forth above in claim 3.

Denno does not explicitly disclose "a predetermined number of clock cycles" and "the

number is two".

However, Geile teaches wherein the act of waiting is performed for a predetermined

number of clock cycles wherein the number is two (see FIG. 74, holding/waiting latches 2612

holds/waits for two clock cycles; see page 45, paragraph 439).

Therefore, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to provide *"a predetermined number of clock cycles" and "the number*

is two" as taught by Geile in the system of Denno, so that it would provide provides bandwidth-

limited digital I and Q signals (representing amplitude and quadrature) for a 200 kHz bandwidth

received analog modem signal, wherein the digital result has very high resolution and accuracy;

see Geile page 2-3, paragraph 27.

Regarding claims 12 and 13, Denno discloses wherein the normalized complex number

is presented to the closed loop convergence (see FIG. 4, frequency compensation circuit

wait/stop for closed loop convergence/meet/junction where the loop comprises phase error

estimation 21 and phase equalization circuit 22; see col. 5, line 30 to col. 6, line 16).

Denno does not explicitly disclose "*a predetermined period of time wherein*

predetermined period of time corresponds to a predetermined number of clock cycles".

However, Geile teaches a predetermined period of time wherein predetermined period of

time corresponds to a predetermined number of clock cycles (see FIG. 74, holding/waiting

latches 2612 holds/waits for two clock/time cycles; see page 45, paragraph 439).

Therefore, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to provide *a predetermined period of time wherein predetermined period*

of time corresponds to a predetermined number of clock cycles" as taught by Geile in the system

of Denno, so that it would provide provides bandwidth-limited digital I and Q signals

(representing amplitude and quadrature) for a 200 kHz bandwidth received analog modem

signal, wherein the digital result has very high resolution and accuracy; see Geile page 2-3,

paragraph 27.

9.   Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Denno in view of

Kim (US006853616B1).

Regarding Claims 5, Denno discloses the act of determining the phase comprises

processing the signal that is proportional to the phase of the complex number to yield the phase

of the complex number (see col. 5, line 49 to col. 6, line 25; see col. 8, line 65 to col. 10, line 56;

estimating/determining the phase the signal which is proportional/relative to the phase of the

complex number to give/yield the determined/estimated the phase of complex number).

Denno does not explicitly disclose *"dividing the signal by a number"*.

However, Kim teaches the act of determining the phase comprises dividing the signal that

is proportional to the phase of the complex number by a number to yield the phase of the

complex number (see FIG. 2, phase calculator 240 divides the signal that is proportional to the

phase of the complex value by a number to give/yield the phase of the complex value; see col. 2,

line 55-67; see col. 3, line 40 to col. 4, line 30).

Therefore, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to provide *""dividing the signal by a number"*. as taught by Kim in the

system of Denno, so that it would provide an OFDM receiver for simultaneously carrying

position recovery and sampling clock control using a detected phase differences; see Kim page 2,

paragraph 25-30.

10.   Claim 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Denno in

view of Sudo (US7403471).

Regarding Claims 7 and 14, Denno discloses wherein the circuitry that normalizes the

complex number as set forth in claim above.

Denno does not explicitly disclose *"circuitry adapted to invert the complex number to*

obtain an inverted complex number; circuitry adapted to determine a complex conjugate of the

inverted complex number; and circuitry adapted to multiply the complex conjugate of the

inverted complex number by the complex number".

However, Sudo teaches circuitry adapted to invert the complex number to obtain an

inverted complex number (see FIG. 4, conjugate complex number generator 43 with inverting

functionality that inverts the complex number to form inverted complex number; see col. 2, line

2 to col. 3, line 10);

circuitry adapted to determine a complex conjugate of the inverted complex number (see

FIG. 4, conjugate complex number generator 43 with conjugate complex number functionality

generates/creates conjugate complex number see col. 2, line 2 to col. 3, line 10); and

circuitry adapted to multiply the complex conjugate of the inverted complex number by

the complex number (see FIG. 4, multiplier 42 multiply the complex conjugate of the inverted

complex number with complex number; see col. 2, line 2 to col. 3, line 10).

Therefore, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to provide *"circuitry adapted to invert the complex number to obtain an*

inverted complex number; circuitry adapted to determine a complex conjugate of the inverted

complex number; and circuitry adapted to multiply the complex conjugate of the inverted

complex number by the complex number" as taught by Sudo in the system of Denno, so that it

would provide eliminate any phase difference between transmission and reception carriers and

phase variation; see Sudo see col. 3, line 25-30.

11.   Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Denno in view of

Taura (US6438183).

Regarding Claims 11, Denno discloses wherein the output that is proportional to the

phase of the complex number as set in claim above.

Denno does not explicitly disclose the number is *"twice"*.

However, Taura teaches the output that is proportional to the phase of the complex number is twice the phase of the complex number (see FIG. 3, the output is two times phase of the complex number; see col. 2, line 55-67; see col. 3, line 40 to col. 4, line 30).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide *"twice"* as taught by Taura in the system of Denno, so that it would avoid mistaking false correlation peaks for the true tuning point; see Taura col. 2, lines 5-20.

12.   Claims 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Denno in view Ohkubo, and further in view of Taura (US6438183).

Regarding Claims 17, the combined system of Denno and Ohkubo discloses wherein the output that is proportional to the phase of the complex number as set in claim above.

Neither Denno nor Ohkubo explicitly disclose the number is *"twice"*.

However, Taura teaches the output that is proportional to the phase of the complex number is twice the phase of the complex number (see FIG. 3, the output is two times phase of the complex number; see col. 2, line 55-67; see col. 3, line 40 to col. 4, line 30).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide *"twice"* as taught by Taura in the combined system of Denno and Ohkubo, so that it would avoid mistaking false correlation peaks for the true tuning point; see Taura col. 2, lines 5-20.

13.   Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Denno in view of

Ohkubo and further in view of Geile (US 20090122883).

        Regarding Claim 18, the combined system of Denno and Ohkubo discloses wherein the

act of waiting is performed as set forth in claim above.

        Neither Denno nor Ohkubo explicitly disclose "a predetermined number of clock cycles".

        However, Geile teaches wherein the act of waiting is performed for a predetermined

number of clock cycles (see FIG. 74, holding/waiting latches 2612 holds/waits for two clock

cycles; see page 45, paragraph 439).

        Therefore, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to provide *"a predetermined number of clock cycles"* as taught by Geile

in the system of Denno, so that it would provide provides bandwidth-limited digital I and Q

signals (representing amplitude and quadrature) for a 200 kHz bandwidth received analog

modem signal, wherein the digital result has very high resolution and accuracy; see Geile page 2-

3, paragraph 27.

14.   Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Denno in view of

Ohkubo and further in view of SuDo (US7403471).

        Regarding Claim 19, the combined system of Denno and Ohkubo discloses wherein the

circuitry that normalizes the complex number as set forth in claim above.

        Neither Denno nor Ohkubo explicitly disclose *"circuitry adapted to invert the complex*

number to obtain an inverted complex number; circuitry adapted to determine a complex

conjugate of the inverted complex number; and circuitry adapted to multiply the complex

conjugate of the inverted complex number by the complex number".

However, Sudo teaches circuitry adapted to invert the complex number to obtain an

inverted complex number (see FIG. 4, conjugate complex number generator 43 with inverting

functionality that inverts the complex number to form inverted complex number; see col. 2, line

2 to col. 3, line 10);

circuitry adapted to determine a complex conjugate of the inverted complex number (see

FIG. 4, conjugate complex number generator 43 with conjugate complex number functionality

generates/creates conjugate complex number; see col. 2, line 2 to col. 3, line 10); and

circuitry adapted to multiply the complex conjugate of the inverted complex number by

the complex number (see FIG. 4, multiplier 42 multiply the complex conjugate of the inverted

complex number with complex number; see col. 2, line 2 to col. 3, line 10).

Therefore, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to provide *"circuitry adapted to invert the complex number to obtain an*

inverted complex number; circuitry adapted to determine a complex conjugate of the inverted

complex number; and circuitry adapted to multiply the complex conjugate of the inverted

complex number by the complex number" as taught by Sudo in the combined system of Denno

and Ohkubo, so that it would provide eliminate any phase difference between transmission and

reception carriers and phase variation; see Sudo see col. 3, line 25-30.

Allowable Subject Matter

15.   **Claims 15 and 20** are objected to as being dependent upon a rejected base claim and objected paragraph 3 set forth above, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

16.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to IAN N. MOORE whose telephone number is (571)272-3085. The examiner can normally be reached on 7:30 AM- 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Derrick W. Ferris can be reached on 571-272-3123. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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